



The Climate Change Crystal Ball

Since the turn of the century, the average daily temperature in the United States has increased by 0.4°C. Most of that increase has happened during the last 30 years, and there is mounting evidence that atmospheric pollution will cause this warming trend to continue into the next century. With the warmer weather have come other climatic changes: the rate of evaporation seems to be decreasing in the United States on average, while cloud cover and precipitation seem to be increasing. There is evidence, too, that the nation can look forward to a future with more violent storms.

In the wake of these observations, the question of how climate change will effect both the environment and human health takes on vital importance and terrific complexity. Will the temperature increases cause hundreds more heat-related deaths in states such as Texas and Florida? Will diseases that are native to hot climates such as dengue and cholera find a warmer north more hospitable, and if so, will science be able to prevent their spread? Are water treatment systems prepared for flood events that could sweep more contaminants into drinking water?

Analyzing all the health-related outcomes of climate change and predicting human response to those outcomes may sound like an impossible task, but the U.S. Environmental Protection Agency has enlisted dozens of researchers from 11 universities and public institutions to do just that. The fruit of their research can be found on the Climate Change and Human Health Web site, located at <http://www.jhu.edu/~climate/>.

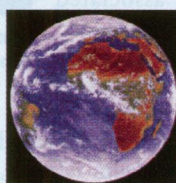
The Climate Change and Human Health Web site stems from a \$3 million Environmental Protection Agency grant to Johns Hopkins University, and fulfills one of the agency's main objectives. "One of the key purposes of the grant was to make this information public," explains Rebecca Freeman, a doctoral student in the Department of Geography and Environmental Engineering at Johns Hopkins and the creator of the Web site. "One way to do this, obviously, is to disseminate our research via the Internet. We're trying to encourage communication among scientists and to collect feedback from informed readers." The site will also put the group's findings where they can be utilized by the policy makers who may be in the best position to mitigate the health consequences associated with global warming.

The site offers visitors insight into the complexity of the problems of climate change and the progress being made in addressing them. For example, among the abstracts and progress reports located on the site are descriptions of a study being undertaken by a group focusing on the potential spread of *Cryptosporidium* in Lancaster County, Pennsylvania. Despite the comparatively small scope of the project, it has involved years of complicated research spanning many disciplines. First, the group mapped Lancaster watersheds and runoff patterns to find the areas that are prone to flood. Then, water treatment systems and well fields were superimposed on the map, and a countywide survey was taken to find where in the area *Cryptosporidium* was dwelling. Knowing this helped researchers predict what drinking water supplies might become infected

during a violent storm event. But the project has also raised other questions, such as whether the operators of water treatment systems would be able to respond quickly enough to prevent tainted water from reaching people's taps, whether people would heed advisories to boil drinking water, how much of an effect a diarrheal disease such as cryptosporidiosis would have in a place like Lancaster County, and what the overall cost to society of such an incident would be.

Many of the computer-based tools that are helping researchers answer such questions are linked to the Climate Change and

Climate Change and Human Health



Human Health Web site and can be accessed by following the Analysis Tool Box link on the home page. There are links on the Analysis Tools page to available software packages that assist scientists in conducting epidemiological studies, mapping projects, and performing statistical demographic, and population analyses. Besides cryptosporidiosis, other health end points that are currently being analyzed include cholera, hantavirus, Lyme disease, dengue, and dengue hemorrhagic fever.

On the home page are links to the seven major divisions of the project: climate analysis, remote sensing, spatial analysis, hydrologic modeling, geographic information systems, public health effects, and risk communication and characterization. As the project progresses, these links will provide visitors with detailed descriptions of the research in each area, the group's preliminary conclusions, and plans for future research.

A list of the principal researchers in the Climate Change and Human Health project is available by following the Expert Database on the home page. Each researcher's name is linked to a description of his or her current research and a list of literature citations. More climate change-related literature citations can be found through the Publications Database link on the home page.

The very latest project publications can be found by following the News and Events link on the home page. Also under this link is a listing of upcoming meetings and conferences relating to climate change, such as the Second International Conference on Ecosystems and Sustainable Development, scheduled for May 31–June 2 in Southampton, United Kingdom, and the 4th International Congress on Energy, Environment, and Technological Innovation, to be held 20–24 October 1999 in Rome. Links are provided to assist visitors with getting more information about these events.

Besides Johns Hopkins, other institutions participating in the project are the University of Maryland, Pennsylvania State University, the University of Delaware, the Georgia Institute of Technology, Science Communication Studies, the National Oceanic and Atmospheric Administration, the National Aeronautics and Space Administration, the University of South Florida, the U.S. Department of Agriculture, the University of Texas in Houston, and the New Orleans Mosquito Control Board.